

Technology Opportunity

A Visual Computing Environment (VCE) for Parallel Multidisciplinary Simulation of Aircraft Engines

Aircraft engines consist of many components. While performance characteristics for each individual component can be obtained by performing computer simulations in a wide variety of engineering disciplines, such as Computational Fluid Dynamics (CFD), Computational Structural Dynamics (CSD) or vibration analysis; a fully integrated multidisciplinary analysis process is desired. The Visual Computing Environment (VCE) facilitates a multidisciplinary simulation of entire aircraft engines, and as such is part of NASA's Numerical Propulsion Simulation System (NPSS) effort.

Potential Commercial Uses

The Visual Computing Environment (VCE) was originally developed as part of the NASA Lewis' NPSS program for aircraft engine analysis by CFD Research Corporation (CFDRC). In a project with Pratt & Whitney (P&W) and NASA Lewis, CFDRC uses this technology for "High Performance Propulsion Simulation Applications." Furthermore, this technology is being used as part of the National Combustor Code (NCC) by NASA Lewis, P&W, and CFDRC, for integrating grid generator, flow solver, and visualization capabilities in one integrated environment. VCE tools are explored for aircraft aeroelasticity problems, electronics packaging and system cooling, biomedical applications, and for designing MicroElectro-Mechanical-Systems (MEMS).

Benefits

Truly multidisciplinary analysis of entire aircraft engines leads to higher fidelity analysis results. Furthermore, the Visual Computing Environment (VCE) allows these simulations to be done in a more efficient manner, resulting in a shorter analysis

cycle. A shorter analysis cycle allows more configurations to be explored, the "time-to-market" of commercial aircraft engines is shortened, and the analysis results may actually impact the design.

The Technology

The goal of multidisciplinary analysis is obtained by providing a high level of connectivity between the simulation tools from various engineering disciplines, such as geometry modeling, grid generation, Computational Fluid Dynamics (CFD), Computational Structural Dynamics (CSD), and visualization. The Visual Computing Environment (VCE) allows those tools to be run in a parallel distributed fashion on a cluster of heterogeneous workstations. The user may interactively select and couple any set of codes.

Options for Commercialization

The Visual Computing Environment (VCE) software could be utilized for many high performance multidisciplinary analysis applications in a wide variety of industries. CFD Research Corporation is actively seeking government and/or industrial partners to further develop and apply this technology for aerospace or other engineering applications.

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Key Words

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